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Connecting Physical Damage to Social and Economic Impacts

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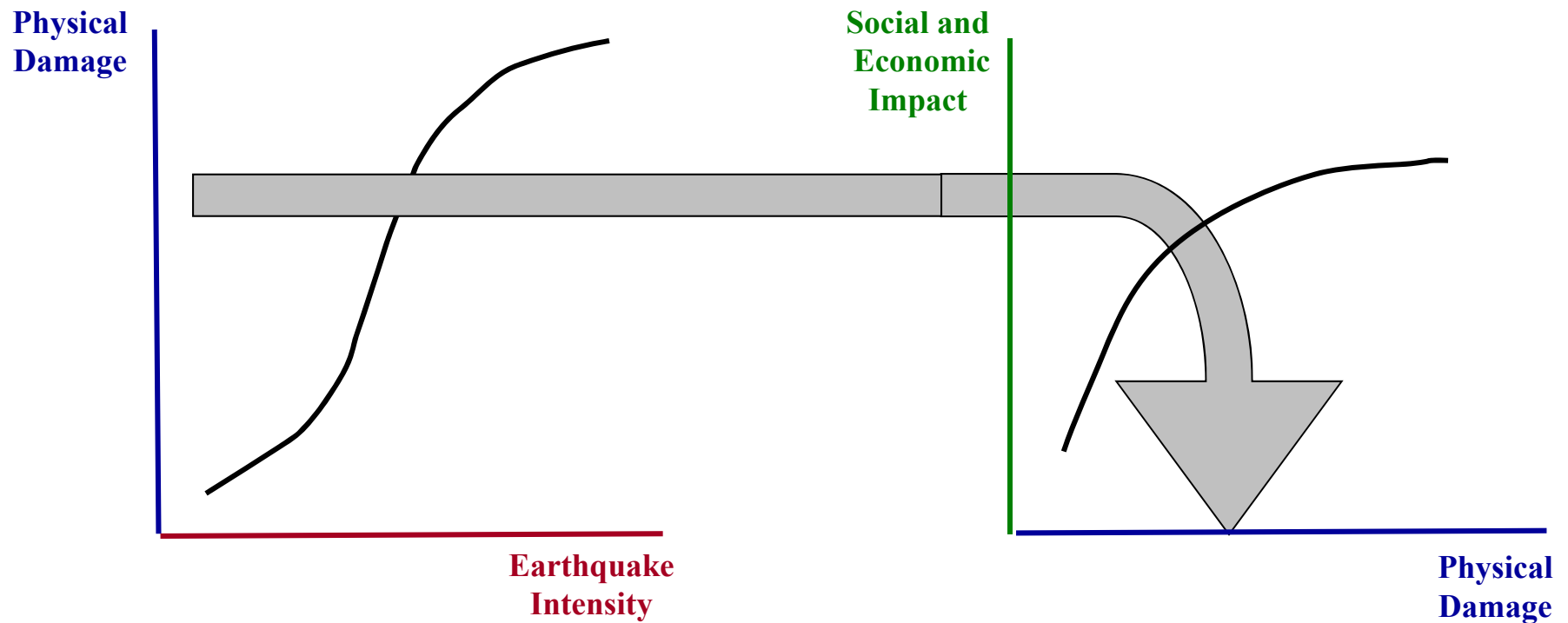**Atlanta, GA 30332-0695**

Earthquake Damage Impacts

We have made great progress in modeling physical damage to buildings and infrastructure

Planning emergency response, recovery and mitigation requires translation of physical damage to social and economic impacts

Links between Damage and Impacts

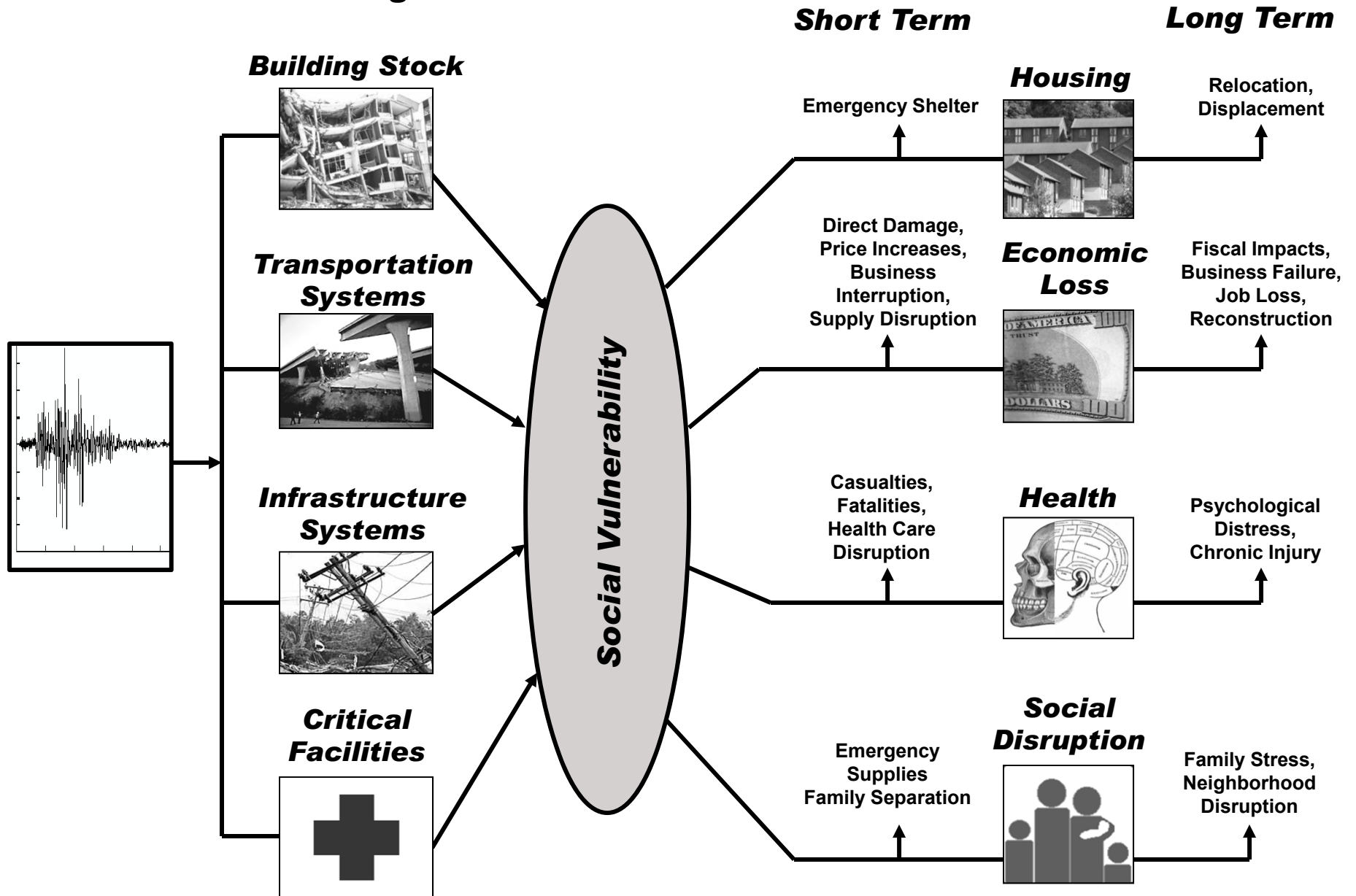Earthquake Intensity determines Physical Damage

Physical Damage determines Social and Economic Impacts

Earthquake Event

Physical Damage

Social and Economic Impacts

Short Term

Long Term

Building Stock

Transportation Systems

Infrastructure Systems

Critical Facilities

Social Vulnerability

Emergency Shelter

Housing

Relocation, Displacement

Direct Damage, Price Increases, Business Interruption, Supply Disruption

Economic Loss

Fiscal Impacts, Business Failure, Job Loss, Reconstruction

Casualties, Fatalities, Health Care Disruption

Health

Psychological Distress, Chronic Injury

Emergency Supplies Family Separation

Social Disruption

Family Stress, Neighborhood Disruption
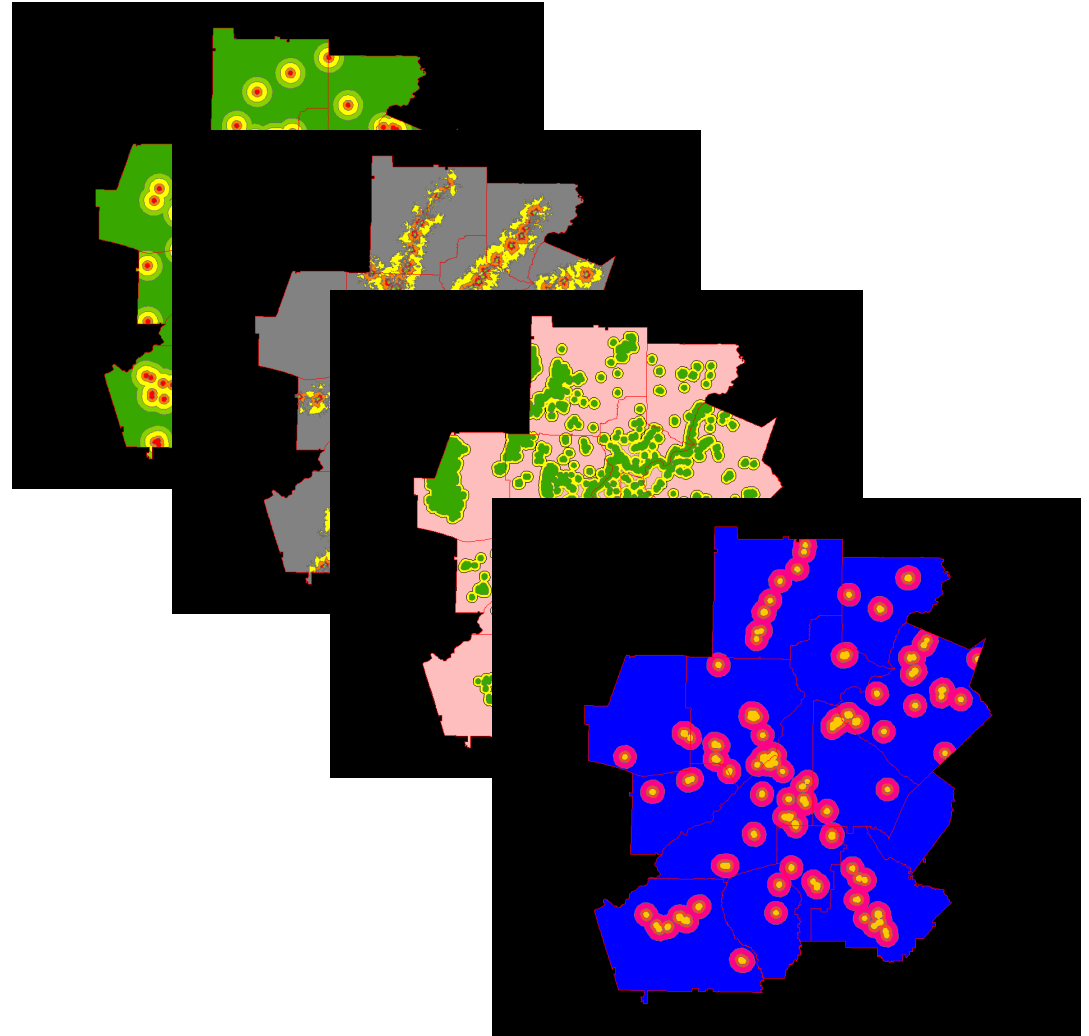
Social and Economic Linking Factors

Building Occupancy or Land Use

Demographic Characteristics of population

Detailed Employment Characteristics (NAICS)

Linking by Spatial Location

Social and economic data can be linked with physical damage by spatial location using GIS

Housing Impacts

Short Term

Housing usually accounts for the largest number of
Emergency Shelter
units and the most economic loss because housing
Food, Water, Sanitation
makes up 80-90% of the building stock

Long Term

Loss of Rental Housing

Relocation

Increased Debt Loads for Repair

Economic Loss

<u>Short Term</u>

    Repair and replacement costs

    Business Interruption

    Supply Disruption

    Price Increases

<u>Long Term</u>

    Fiscal Impacts

    Business Failure

    Job Loss

Health Impacts

Short Term

Casualties

Fatalities

Service delivery disruption

Long Term

Chronic injuries

Psychological distress

Social Disruption

Short Term

    Family Separation

Long Term

    Neighborhood disruption

Key Data Sources

Traditional Sources

    Tax Assessor Records

    Population Census

    Economic Census

Urban Big Data

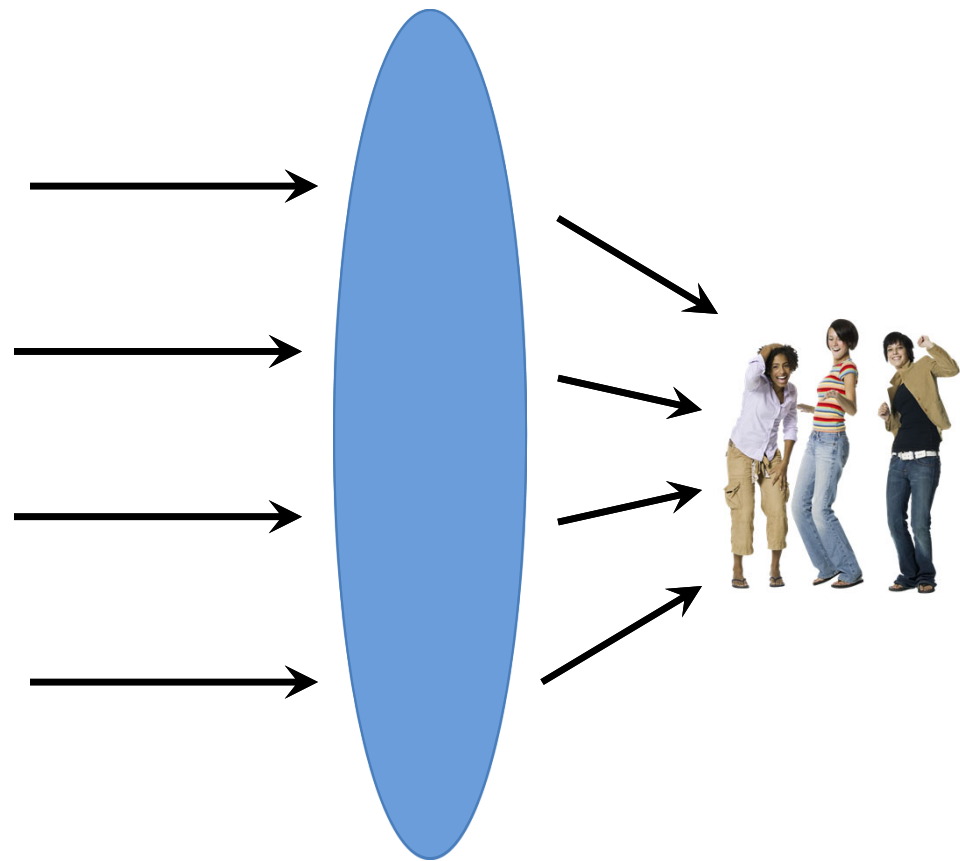Cell phone location Data

Transit boarding records

Infrastructure sensors

Video surveillance logs

Drone imagery

The Lens of Social Vulnerability

Vulnerable populations (children, senior citizens, disabled, low income) suffer a disproportionate share of social and economic impacts

Conclusions

Social and economic impacts drive response and mitigation effort

Can now model social and economic impacts

Land use, demographics and detailed employment

New data sources provide better insights on social and economic acitivities